On a new Form of the Differential Thermometer, with some of its Applications. *By* William Ritchie, *A.M. Rector of Tain Academy. Communicated by* J. F. W. Herschel, *Esq. Sec. R.S.* Read December 21, 1826. [*Phil. Trans.* 1827, *p.* 129.]

The instrument described by Mr. Ritchie in this paper, consists of two hollow cylinders of tin-plate, of large diameters in proportion to their height, placed with their bases parallel to each other, and at a moderate distance, and connected by a glass thermometer-tube, containing a coloured liquid, and in the form of an inverted syphon, after the manner of the photometer described by the same author in the Philosophical Transactions for last year. This instrument being placed between two sources of radiant heat, at such distances that the coloured liquid shall remain stationary in the tube, fixes the distances of equal radiation, from whence the radiations at equal distances may be calculated, supposing the law of the decrease of heat by radiation known, and *vice versâ*, supposing the ratio of the heats radiated at equal distances known, the law of radiation may be experimentally investigated.

As instances of the application of this instrument to experimental purposes, the author relates several experiments on iron balls, equally heated, and exposed at such distances as to subtend equal apparent diameters at the faces of the cylinders. From these he concludes that the law of the decrease of heat, as the inverse squares of the distances, is founded in fact. When, however, the heated bodies exposed had flat surfaces corresponding to those of the surfaces of the cylinders, he found a less rapid law of decrease to hold good; from which he concludes, that a constant portion of heat is radiated directly out from the surface without divergence, because an equal quantity, added to both terms of a ratio of greater inequality, as is well known, diminishes the ratio.

On the Structure and Use of the Submaxillary Odoriferous Gland in the Genus Crocodilus. *By* Thomas Bell, *Esq. F.L.S. G.S. Communicated by Sir* Everard Home, *Bart. V.P.R.S.* Read March 1, 1827. [*Phil. Trans.* 1827, *p.* 132.]

The author begins by remarking on the general inattention prevailing among anatomists, to such glands as produce anomalous secretions, required only by the peculiar and exclusive habits of the animals possessing them. A gland of this kind subsists beneath the lower jaw of the alligator and crocodile. It is situated on each side, and secretes an unctuous substance of a strong musky odour. Neither its structure nor its probable object have yet been considered with any care, till the author, about two years ago, discovered in it a structure which he thinks is without a parallel in the glandular system of other animals. His observations were made on the common alligator of America. In this animal the external orifice of the gland is situated

about two thirds of the length of the lower jaw backwards from the symphysis, being a longitudinal slit a little within the lower edge of the basis of the jaw, and through it exudes an unctuous substance of the consistence of suet and the smell of musk. During warm weather, when the animal feeds freely, the secretion is copious; but in winter is much diminished in quantity, and less powerful in scent.

The gland, on removing the integuments, is seen lying between the skin and under-surface of the tongue. It consists of a simple follicle or sac, of a blueish colour, and an elongated and pyriform shape. In an alligator four feet in length, it is about half an inch long and one sixth in diameter. It is lined with a soft secreting membrane.

The gland is enveloped by extremely fine, delicate, muscular fibres, disposed obliquely, and consisting of two fasciculi, passing respectively over and under the gland, and uniting at its base into a long slender round muscle, which, after making a slight curve forwards, proceeds directly back to the corner of the os hyoides, to which it is closely united; and following the course of another muscle apparently identical with the mylo-hyoideus in mammifera. The use of the muscle seems to be to bring the gland into a proper position for discharging its contents, and to operate such discharge by its pressure.

The author, taking into consideration the situation of the gland near the mouth of the alligator, its predatory habits and voracity of fish, and the well-known partiality of fish for odoriferous oils and extracts, conceives that the use of this secretion is to act as a bait, and attract the fish to such a position that he can easily seize on them, in his usual way of seizing his prey, by snapping sideways at them.

On the Permeability of Transparent Screens of extreme Tenuity by radiant Heat. By William Ritchie, *A.M. Rector of Tain Academy. Communicated by* J. F. W. Herschel, *Esq. Sec. R.S.* Read March 8, 1827. [*Phil. Trans.* 1827, *p.* 139.]

The author states in this paper, that invisible radiant heat, from sources at elevated temperatures, freely permeates thin transparent screens in the same manner as light; but that as this doctine, established by Profesor Prévost and M. de la Roche has been controverted, he thinks it necessary to demonstrate it by fresh experiments: to this end he covered a small aperture with a film of glass almost iridescent, and keeping it constantly cold, by blowing on it, below the temperature of ambient air, he found that an air-thermometer on one side of it was not affected by a heated iron ball on the other, if the temperature of the ball was low; but that as this temperature was raised, though not to the point of visible ignition, the effect on the thermometer became sensible and even considerable.

In another experiment, two air-thermometers, having their bulbs transparent, and as thin as possible, were placed equidistant from a heated ball just ceasing to be visible in the dark. The one was clear,